1

2

3

4

5

6

7

1

2

3

4 & 5

6

7

1

2

3

4

5

6

7

8

20

21

22

23

24

2

3

4

1

2

3

4

5

6

7

8

4

5

6

7

1

2

3

4

5

6

7

8

9

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

3

4

5

6

7

8

9

4

5

6

7

8

9

1

2

3

4

5

6

Comment

Water Quality Standards

Page 25, Temperature criteria bullet 2: A reference is made to the equation t=34/ (T+9) on page 7 and the definition of capital “T” in this relationship as the natural temperature condition. This interpretation contradicts the definition given in Appendix F were “T” is defined as the background temperature as measured at a point or points unaffected by the discharge and representative of the highest ambient water temperature in the vicinity of the discharge (a similar definition of “T” as representing the background temperature is also given in 2006 WAC 173-201A-200-1-c-ii-A as well as in previous versions of the Water Quality Standards). From this definition of “T” as background temperature or ambient water temperature in the vicinity of the discharge, it seems clear that is criterion should not be interpreted as an allowable change from „natural water temperatures“ and is application to thermal point sources to the river.

The Special Temperature Condition for the Pend Oreille River likely does not adequately protect critical habitat for bull trout migration when the river is less than 20°C and greater than 10°C because it allows 1 to1.8°C increases from human causes above natural conditions for the entire river. The timing of the large allowable increase is during the late-summer critical period when bull trout would normally try to reenter the river for feeding and migration.

In the cover letter to the 2008 BiOp for EPA“s approval of Washington“s Water Quality Standards, USFWS stated the following:

“Based on the information provided in the BE, meetings, and written and verbal correspondence since the project started, the FWS has determined that approval and implementation of the 2006 Washington WQS will have adverse effects to bull trout and designated habitat for the bull trout in areas and/or situations where the standards do not provide adequate protection for essential habitat elements or the life history stage(s) that occur or may be present in the reach”.

The USFWS appeared to have resolved a portion of the above issue with the Conservation Recommendation in the associated BiOp as follows:

“The WDOE did not revise the special temperature criteria for several rivers in eastern Washington, resulting in water bodies that were designated as “salmon spawning, rearing, and migration use” or “salmon rearing and migration” under the proposed action retaining temperature standards that are well above 17.5 °C. Based on the letter from WDOE to the EPA (dated January 28, 2008), the State has agreed to address the special temperature provisions in the TMDL process. The FWS recommends that, if model calculations indicate that the temperature

Because there are errors and inconsistencies in the stream names and designated uses, all tributaries to the Pend Oreille River need to have reconfirmation of the appropriate use-based criteria for each stream and have the subsequent target shade requirements revised to meet the designated Char use-based criteria. The criteria and revised tributary TMDL must be applied to the entire stream.

The water quality standards (WQS) for the Pend Oreille River, as well as other surface waters in the State of Washington, are being reviewed by the Department of Ecology. The triennial review by Ecology will not be completed until 2011. Is it logical to complete a TMDL regulation for the Pend Oreille River before the results of the triennial review of the WQS for the Pend Oreille River has been completed?

Statements made in the temperature TMDL report regarding the Pend Oreille River are misleading, if not erroneous. On page 7 of the draft report, statement is made that the Pend Oreille River has a special temperature criteria. This is based upon the table at WAC 173- 201A-602. What the report does not state is that the designated use of the Pend Oreille River for aquatic life is "Spawning/Rearing." The Pend Oreille River is not designated for char spawning and rearing. As shown in table 600 in WAC 173-201A-600, Spawning/Rearing has a key identifying characteristic with trout spawning and emergence that only occurs outside of the summer season (September 16 -June 14). No reference is made to this characteristic. As noted in the report, the temperature increases (if real) of 0.3° C occur during the months of July and August, not during the key characteristic period of September 16 -June 14.

Application of the "Part 2" formula: SCL respectfully disagrees with Ecology's application of the "Part 2" formula in the TMDL context. Rather, SCL agrees with the Attorney General's initial interpretation of the water quality standards (August 14,2009 memorandum from Ron Lavigne to Susan Braley re "Pend Oreille Temp"). Specifically, the only relevant criteria for assessing impairment / attainment in the TMDL context is 20.0°C or, if natural condition is above 20.0°C, natural condition + 0.3 degrees. The "Part 2" formula is only applicable in the NPDES permitting context, where a point source discharge can be compared to observed background conditions in real time. The formula is not applicable in the TMDL context where existing 'conditions are compared to modeled natural conditions. In addition to the Attorney General's August 2009 memorandum, this interpretation is supported by closely comparing the Pend Oreille River's special temperature criteria to the general water quality criteria that it replaces. Specifically, the off-peak formula in the Pend Oreille criteria directly correlates with the general criteria provisions at WAC 173-201A- 200(c)(ii); those provisions contain a very similarly phrased formula that applies exclusively to "Incremental temperature increases resulting from individual point source activities." The general criteria provision goes on to define the method for measuring compliance with the formula, indicating that it is a real time measurement relative to background, not a modeling comparison between

Modeling

Page 16, CE-QUAL-W2 temperature model: Need to explain the Idaho section of the model. The output of the Idaho CE-QUAL-W2 model is the input to the Box Canyon model and thus is a very important boundary condition.

Page 19, Model Calibration, First Paragraph: Was the updated version of the Idaho model used for boundary conditions or did Ecology use the original 2006/2007 PSU version of the Idaho model for the boundary conditions? The Seattle District recommends that the updated version of the Idaho CE-QUAL-W2 model for the existing and natural conditions should be used to represent boundary conditions for the Box Canyon Model.

There should be a discussion of the uncertainty in model estimates and prediction error relative to decisions regarding compliance using a 0.3 C delta temperature threshold.

Pg xi, paragraph 2, Overview of Results: Where are these predicted natural water temperatures from the models used in this document? It would be helpful if there was a reference to how the model justifies these predicted water temperatures.

Page 98: Sentence: “The model will need to be rerun to determine compliance because natural conditions, which the allocations are based on…” What are the parameters the model uses to determine the natural condition of the river?

Page 19, Model Calibration: The important calibration estimate would be for the period when there is the most potential for critical conditions affecting the most sensitive species. The model calibration should focus on late summer conditions and be most accurate when excess heat load contributes to potential thermal barriers which limit use of the river that is normally available to bull trout, given seasonal and diurnal cooling. Calibrating the model for the entire season and not the most critical condition does not assure that the modeling method contributes to a margin of safety.

How is uncertainty in the model predictions considered in the analysis and subsequently in determination of impairment for the Box Canyon Project? The draft TMDL (p. 19) states that the model calibration uncertainty (RMSE) was 0.41 0c. The determination of impairment is based upon the difference between predicted existing temperatures and predicted natural condition temperatures, in which case, statistically the errors in each of these two quantities should be added in quadrature, resulting in an overall error of 0.58°C. There is no discussion of modeling error, what it implies, or how it was considered in the TMDL. At the very least, charts and graphs should include appropriate error bars, and the text should include an explanation of how model uncertainty is considered. We request that a paragraph be added to discuss the implications of the error in the model, especially since the overall error (0.58°C) is very close to the value of the exceedance for the Box Canyon Reservoir.

TMDL Analysis

The Seattle District agrees with the use of the cumulative frequency method to assess temperature differences between model scenarios. This methodology is beneficial for summarizing the thermal response of two river systems with small differences in travel time and provides a more meaningful statistical summary of water temperatures.

Page 26, Daily maximum temperatures, First Paragraph: Please state the method used to determine the daily maximum temperature. Did Ecology use the maximum temperature in any single cell in a reach, the maximum surface cell temperature or the maximum volume weighted temperature?

Page 42, Heating patterns and temperature shifts, General: The explanation of thermal patterns needs to consider the use of a grid cell based definition for daily maximum temperature where the reach specific maximum temperature will be based on the simulation of surface heating over a calendar day.

The emphasis on instantaneous surface temperatures to define daily maximum temperature in this investigation maybe mischaracterizing the prominent thermal patterns in the Pend Oreille River.

The Draft TMDL masks water quality criteria (WQ) violations by erroneously assuming that the thermal load from Idaho is equivalent to natural conditions. As explained in the attached November 26th Keta Waters Report, median river temperatures downstream of the Albeni Falls Project are often higher than natural in the late summer. For instance, from August 22 – 30, 2004, the difference between natural and impounded daily median temperatures was up to 2.3°C warmer with an average of 0.9°C warmer. A similar trend continues for much of September 2004. Comparison of maximum temperatures also shows that they are often higher than natural conditions in late summer (Keta Waters, 2010(b)). By characterizing these late-summer increases in temperature as natural conditions, the Draft TMDL allows additional degradation of the resource.

The Draft TMDL‟s use of Cumulative Frequency Analysis methodology further obscures water quality violations. The use of Cumulative Frequency Analysis (CFA) methodology has led to erroneous and misleading statements in the Draft TMDL and improper load allocations, now called target temperatures. CFA may be appropriate where observation of occurrences is independent of all others during the period in question and where the timing of occurrences is irrelevant when being used for comparison between sample sets. These assumptions are not appropriate when comparing a thermal regime with river modeling for changes in water temperatures which are temporally and spatially dependent and biologically important to migrating species. The Kalispel Tribe has consistently objected to the misuse of the CFA methodology, particularly as applied during the late summer when thermal barriers will likely delay the migration patterns of threatened bull trout.

The Draft TMDL purportedly uses CFA to correct for a small potential hydraulic lag (max 2- 4 days), which hydropower project owners contend must be accounted for when evaluating temperature impacts on rivers. To evaluate the legitimacy of the claim that hydraulic lag justifies using CFA, the Kalispel Tribe asked Keta Waters to conduct a comparative analysis of CFA method for the Box Canyon reservoir using direct daily comparisons from Ecology‟s natural and existing model scenarios. That analysis shows that there is no hydraulic lag contributing to arbitrary WQ violations (Keta Waters, 2010(b)).

Keta Waters‟ analysis also illustrates that CFA masks many WQ violations and reduces the apparent magnitude of river warming and detected violations throughout the Box Canyon Reservoir, including violations in Kalispel Tribal waters. These underestimations of magnitude and occurrences in WQ violations have resulted in a target temperature reduction in the TMDL that is 42% less stringent than what the actual target should be at the Box Canyon Forebay. And again, this underprotective reduction target does not account for Albeni Falls Dam impacts discussed previously. The scientific defensibility of Ecology‟s CFA methodology is also undercut by a simulation performed by Keta Waters in which a hypothetical discharge into an otherwise completely natural river resulted in a one-degree increase above natural conditions in the Skookum Reach on each day between August 1 and September 5, 2004. This one-degree theoretical
increase, by definition in the state‟s special temperature criteria for the Pend Oreille River, must result in a WQ violation well above the 0.3°C allowable increase on 100 percent of the 35 days when the river was naturally over 20°C, and two more violations when the river was less than 20°C. However, when this theoretical data is inputted into the CFA methodology set forth in the TMDL, the output would indicate that the test-case pollution would only cause a one percent chance of a temperature violation and that the “full temperature profile differential” is equal to 0.022°C (Keta Waters, 2010 (b)). It is therefore clear that the CFA method is unacceptable when defining thermal pollution reduction targets in a TMDL designed to provide resource recovery needs for threatened migratory fish.

By using a data analysis method that ignores temporal impacts and compares occurrences of a given temperature regardless of timing in natural and impounded scenarios, the Draft TMDL introduces a misleading bias into the analysis that systematically ignores ecological impacts caused by changes in timing of cooling and potential negative impacts on migratory fish populations. Ignoring the temporal changes in thermal impacts is as misleading as it would be to compare temperatures regardless of where they occurred spatially in the river. Using an analysis method that hides these late summer thermal impacts caused by river impoundments is inconsistent with the goals of protecting critical habitat for threatened species under ESA and protecting designated beneficial uses under the CWA.
Page xi, third paragraph: A flawed analytical analysis ignoring temporal aspect and the heat load present in the river is the only thing that allows such a misleading statement saying the river is cooler. A direct daily analysis does not allow the same conclusion.

Page xi, fourth paragraph: The temperature criteria exceedances are significantly underestimated and violations are missed completely due to use of CFA method. Averaging of CFA derived underestimations of violations of a daily maximum metric is inappropriate and misleading.
Page xii, Table ES 2: The determination of compliance with WQ criteria is biased by inappropriate CFA methodology that misses and underestimates violations between scenarios, including violations at, and above, the boundaries with tribal waters.

Page 26-40, Methods: The CFA method creates a bias in the data analysis which results in allowances for excess degradation of resources that do not support designated beneficial uses, including those in Kalispel tribal waters. The direct daily comparison method of analysis in the Pend Oreille does not create arbitrary conclusions about criteria violations because a worst-case hydraulic lag time is around 4 days at Boundary Dam.

Page 41-69, Results: The CFA method has created an inaccurate representation of the human-caused thermal impacts by eliminating the important temporal factor. The analyses of existing violations and pollution effects are very much underestimated due to introduction of method bias which masks degradation caused by impoundments and prevents full opportunity for recovery of the resources.
Page 73, Table 11 - The values and conclusions presented are not accurate due to bias in CFA methodology, as described in previous comments.

There is no valid evaluation showing that the 2004/05 years were critical conditions for assessing the thermal regime, especially since the lowest flows of the study period, which occurred in September 2005, were not assessed.
Ecology‟s continued insistence on using a CFA method that masks the full temperature impacts and seasonal criteria violations further eviscerates any marginal protection offered to bull trout by the special temperature condition. This is especially important now since requirements for hydropower mitigation to restore the protective thermal regime for bull trout will rely on the accurate evaluation of temperature impacts in the TMDL.

Page 80, Margin of Safety: The use of CFA methodology, ignoring the heat coming from Idaho, and not accounting for point source contributions, does not provide an accurate initial assessment of existing impacts or provide for any margin of safety.

The report mis-characterizes the non-compliance: When the report is read in full detail, it is clear that the temperature non-compliance in the Box Canyon Reservoir occurs only from the period early-July through late-August (page 31, third paragraph). It only occurs in 17 miles of the 55 mile reservoir (the Skookum, Tiger and Box Forebay Reaches). It is also clear that not every day in this two month period experiences a noncompliance event, that noncompliance may be only for a few hours in duration on some days, and that the noncompliance is only at the surface of the river and does not extend down through the water column. We acknowledge that a non-compliance situation does occur at some times in some places. However, the report is very unclear about the extent of the non-compliance events, and, in fact, in places leads the reader to conclude that the non-compliance lasts all year (see Table 6 on p. 41 and Table 11 on p. 73 as examples). In reports by the press and on the radio after the draft TMDL was released, it was implied that non-compliance was year round by reporting the results shown in Tables 6 and 11, making the temperature exceedances seem much more serious and long lasting than they actually are. Table 6 and 11 say that non compliance is for the years 2004 and 2005. We request that these tables be altered or that an explanation be added under each table that says: "Temperature non-compliance in the Box Canyon Reservoir indicated above has been determined to occur by use of a computer-based model, and occurs only from the period early-July through late-August. Non-compliance only occurs in 17 miles of the 55-mile reservoir (the Skookum, Tiger and Box Forebay Reaches). Not every day in this two month period experiences a non-compliance event. Non-compliance may be only for a few hours in duration on some days, and non-compliance is only at the surface of the river and does not extend all the way down through the water column to the river bottom."

Additionally, the District annual temperature monitoring at depth between Kelly Island in Newport and the Box Canyon Dam forebay shows minimum warming.

The data report in Appendix C, on page C-135, third paragraph, says that the temperature monitoring measured profiles near shore and mid-channel, and that these measured temperatures were all very similar, "indicating again that the river is well-mixed." Yet the measured water temperatures downstream from Box Canyon Dam are clearly lower than those measured upstream. This indicates that there is a strong variation in temperature with depth just upstream of Box Canyon Dam, and this invalidates the "well-mixed" conclusion. This conclusion is borne out by the work done on model development and calibration by Portland State University in 2006, which indicates temperature stratification near-surface in the Box Canyon Reach in late July (refer to their Figures 122-125, and Figures 129-131). This discrepancy has to be addressed in the final report.

As otherwise discussed in these comments, some of the conclusions and results reported in the draft Temperature TMDL Report defy logic. At page 41 of the draft report, the statement is made that there is a "chronically elevated heating pattern" in the Tiger and Box Canyon Forebay reaches. However, there is no logical explanation for such conclusion. As noted in all of the other reaches, the maximum temperatures with the existing conditions are lower than those determined for the natural conditions. The river in the vicinity of Tiger and Box Canyon Forebay is significantly deeper with the existing conditions than the river would be under natural conditions. There is no logical reason to conclude that the maximum temperature would be greater with the existing condition than with the natural condition.
Such conclusions are suspect and should be reviewed.

Pages 41-43 and 54: In the discussion of results, the TMDL should acknowledge the potential upstream impacts of Seven Mile Dam. The Results sections for peak and off-peak temperatures (pp. 41-43 and 54, respectively) do not acknowledge the potential effects of Seven Mile Dam reservoir operations on the existing condition. As noted in SCL's September 26,2007 comment letter on the August 2007 Draft TMDL, these operations were not fully modeled in the tailrace reach. While specific exceedance levels in the tailrace may be moot due to the TMDL's application of load allocations to the forebays, SCL requests that the TMDL acknowledge the potential effect on the tailrace reach. SCL recommends that the following new sentence be added to both the peak and off-peak results sections:
"Seven Mile Dam creates a backwater effect that may contribute to thermal load at the Boundary tailrace but that has not been accounted for in the modeling."

Volume/Flow Weighted Average

The Seattle District Corps of Engineers recommends using daily maximum volume weighted temperatures at a model segment or reach for compliance determinations. Volume weighted temperatures represent the entire water column of the river and are more representative of the water quality in the river and of the dominant aquatic habitat compared to surface cells or single cells.

Use of volume weighted daily maximum temperatures would provide a more accurate and reliable representation of the dominant aquatic habitat compared to surface cells. The interpretation of multi-dimensional modeling results in determining compliance with water quality standards are much more reliable when integrated over larger regions (many cells versus single cell) and time periods (daily average versus daily maximum). The volume of surface cells in CE-QUAL-W2 simulations of impounded and unimpounded river conditions can be significantly different contributing to thermal differences that may be numerically and not physically based.

Why were only maximum temperatures for each model segment (p. 26) considered in the analysis? Basing analyses on only maximum temperatures within each modeled segment effectively restricts the analysis to only the top 1-m of water in the reservoir. This approach does not accurately represent the heat load imparted to the water in the reservoir. A more realistic approach would be to average the temperatures throughout the water column, either a simple arithmetic average of the vertical temperature distribution or a weighted average based on the flow through each cell at each vertical location in the water column. If WDOE will not agree to this change in the analysis, we request that the report include a discussion of why averaging throughout the water column was not used and why this is the preferred analytic method.

There are inconsistent statements made in the draft temperature TMDL report for the Pend Oreille River. On page 3 of the draft report, it is noted that the subsurface portion of the Pend Oreille River can be cooler than that closer to the water surface where the daily maximum temperatures are typically found. This is essentially an admission that using daily maximum temperatures is inappropriate for the Pend Oreille River. Yet, on page 26 of the draft temperature TMDL report, the statement is made that "only the daily maximum temperatures... were used for further analysis." The draft report goes on to state, on p. 26, that "the sole use of daily maximum temperatures is consistent with the Pend Oreille River temperature criterion specifically applicable to this TMDL study." Using daily maximum temperatures that occur at the surface does not represent the differences between existing conditions and the natural conditions where the water would be shallow without the Box Canyon Dam. Without Box Canyon Dam, the majority of locations would exhibit higher conditions illustrate the benefits of Box Canyon Dam for water temperature in the Pend Oreille River.
Use of maximum temperatures in the water column is not appropriate or representative of conditions in the river. As SCL and Ecology have discussed on numerous occasions, SCL believes that, for the Pend Oreille River TMDL, flow-weighted daily maximum temperature is the most appropriate metric for assessing compliance with water quality standards because it is most representative of conditions in the river. Rather than reargue the issue, SCL incorporates herein by reference its earlier comments on this issue as provided in our letters to Ecology and other addressees dated April 15, 2008, September 26, 2007 and May 24,
2007. In addition, the results of SCL's analysis using flow-weighted temperatures and indicating no exceedances of water quality standards in the Boundary forebay and no contribution of the Boundary project to exceedances, are contained in the technical memorandum regarding "Temperature Modeling and Alternative Operations Analyses for Boundary Hydroelectric Project -CWA 401 Certification Support," dated August 19, 2009 and in Exhibit E to the SCL's September 2009 License Application to the Federal Energy Regulatory Commission for the 'Boundary Project. SCL has previously provided both the Memorandum and Exhibit E to Ecology, and incorporates them herein by reference.

Subsurface Withdrawal of Cold Water

Page xi, Overview of results, Second Paragraph: Albeni Falls forebay does not stratify and subsurface withdrawal is not the source of colder water. The cooling effect in Pend Oreille River temperatures is due to Albeni Falls maintaining a higher Lake Pend Oreille elevation during the summer which allows for the exchange of deeper cooler waters from Lake Pend Oreille into the Pend Oreille River for Existing Conditions. For Natural Conditions the lake elevation was lower and a sill at the outlet of the lake prevented the exchange of cooler deep water from the lake to the river resulting in warmer surface waters entering the Pend Oreille River under natural conditions.

Page 78, Hydroelectric facilities, Second Paragraph: Are there field/model/calibration data that corroborate that the forebay of Box Canyon stratifies and has cooler subsurface water? Based on Box Canyon Model (PSU 2007) and Washington Ecology field data (Ecology 2004), the forebay at Box Canyon does not stratify and there is no source of deeper cooler water being withdrawn for power generation.
Page 42, Heating patterns and temperature shifts, Fourth Paragraph: States Similar to Albeni Falls, the Box Canyon facility withdraws water for power generation from a deeper and colder region of the water column in its forebay. Disagree with statement. Albeni Falls forebay does not stratify with deeper cooler water being drawn for power generation. Also, based on Box Canyon Model (PSU 2007) and Washington Ecology field data (Ecology 2004), the forebay at Box Canyon does not stratify and there is no source of deeper cooler water being withdrawn for power generation.

Pg xi, paragraph 2, Overview of Results: Existing data collected during relicensing process for both Box Canyon and Boundary hydroelectric projects indicate that the reservoirs do not stratify except immediately upriver of each dam where the stratification is not significant. There is no data that we are aware of that indicates that the river cools down from Newport to Blueslide. A reference to the data that supports the above statement would be appropriate.
Pg 42, paragraph 2, Heating Patterns and Temperature Shifts: There does not appear to be historic water temperature data for the portion of the Pend Oreille River between Albeni Falls Dam and Lake Pend Oreille for the above comments that the existing situation with the dam provides cooler water than without the dam. If so, this should be referenced.
Based upon modeling data presented in the Idaho Pend Oreille River Model Scenario Simulations Technical Report, the high water temperatures coming out of Lake Pend Oreille are almost identical to water temperatures in the forebay of Albeni Falls Dam. The summer water temperatures, during the period of concern, range from about 22 to 25 Degrees C. with very little stratification. It is difficult to consider these cooler water temperatures passing below Albeni Falls.

Pg 42, paragraph 4, Heating Patterns and Temperature Shifts: Previous information from the Application for New License: – Box Canyon Hydroelectric Project FERC No. 2042 indicates that “Data for maximum water temperatures and seasonal temperature regimes in the BCR are well documented in other reports (Pelletier and Coots 1990; Coots and Willms 1991; Skillingstad et al 1993; EPA 1993 miscellaneous District records). All studies showed the river to be homothermous throughout with no vertical or horizontal stratification.” The discrepancy concerning stratification of the reservoir, between this draft TMDL and these documents, is confusing and should be addressed.

Page xi, first paragraph: This statement using the word “subtle” and cooler is misleading. Reaches are not cooler than natural in late summer. The stored heat and reduced cooling present in the river causes much higher temperatures both on the average and maximum temperature in late summer which is evident when using appropriate analysis and accounting for upstream heat sources.

Page xi, second paragraph: The river is not cooler for an extended period in late summer below Albeni Falls which is evident in an analysis that preserves temporal aspects of the thermal regime.
How do you reconcile the result that implies that the highest temperatures in the Box Canyon forebay reach are on the order of 1°C higher than the highest temperatures in the Metaline reach immediately downstream? (compare Figures 15 and 16, pages 47 and 48, respectively). Where did the heat go? The apparent result is merely a remnant of the fact that only surface temperatures are considered in the analysis, and that temperatures at the surface in the Metaline reach result from mixing of the water after passing through Box Canyon Dam. There is no "cooling effect" due to Box Canyon dam, i.e., there is no negative heat load or loss of BTUs. Such illustrations in the TMDL resulting from consideration of only maximum temperatures can be misleading to the reader.

Skookum Heating

Page xii, Table ES-2: Why does the model show the Pend Oreille River to be in compliance upstream and downstream of the Skookum reach, but not in the Skookum reach? Please explain how this reach could be out of compliance when reaches upstream and downstream are in compliance.
Pg 41, Table 6: How can two reaches upstream and three reaches downstream be in compliance but the Skookum Reach be out of compliance. Could this be due to model uncertainty, error or calibration issues in the Skookum reach or possibly due to using surface cells?

Page 44, Figures 12, 13 and 14: An explanation of the change in the natural river temperatures seen over the Skookum Reach is needed. The existing river modeled temperatures are similar from Newport Reach through Kalispel Reach. However, the natural river modeled temperatures change which results in the Skookum Reach being out of compliance. The natural river temperatures are similar at Newport, Dalkena, and Kalispel Reaches but substantially cooler at Skookum Reach. Why does the natural river cool down through the Skookum Reach and then warm up through the Kalispel reach? Because the 4 mile long Skookum Reach represents the only location in the 40 miles between the Newport Reach and Tiger Reach where the temperature criteria is not met, a thorough analysis of the possible source(s) of non compliance is needed.

Page 62, Hydroelectric facilities, Third Paragraph: The explanation of backwater effect and side channel impacts on water temperatures in the Skookum Reach does not seem plausible for a laterally averaged 2-D model such as CE-QUAL-W2. Recommend WDOE more fully analyze and explain the physical source for the odd occurrence of cooler/warmer waters in the Skookum Reach.
What is causing the modeled increased temperatures in the Skookum and Tiger reaches in the existing condition compared to natural conditions in the Box Canyon modeling scenario? Table 6 (p. 41), and Figures 13 and 15 (pp. 45 and 47, respectively) indicate existing temperatures can be increased by as much as 0.5°C and 0.8°C at the Skookum and Tiger reaches, respectively. These do not appear to be merely progressive temperature increases as one moves downstream, but are marked jumps in temperature compared to those reaches upstream or downstream. Examination of the model input parameters could lend insight as to the cause of these increases, which may in turn lead to suggestions for mitigation of these increases. However, we are concerned that part or all of these temperature jumps could be due to an artifact of the modeling, possibly due to specific placement locations of temperature monitoring sensors in these locations. We note that both the Tiger and Skookum reaches have a large slough associated with them that could skew temperature measurements depending on where the temperature sensors were placed. These jumps should be discussed and analyzed in the report body to provide a valid explanation of these predictions.

For example, on page 42, third paragraph, the report states that by the time you reach Tiger and Box Forebay reaches, "the average velocity has been slowed sufficiently to lead to the increased heating." We request that the velocity analysis WDOE did to support this statement be added here in the report. What is the average velocity during the non-compliance time period today and pre-project? How did you conclude that the difference in velocity was "slowed sufficiently" to cause the heating? Doesn't the river slow more and more as you get closer to the dam? Therefore, you would expect the temperatures to increase slowly, in each reach, as you move downstream. But this is not what the model predicts. Why did temperatures increase in the Skookum Reach and then apparently cool off in the next three reaches downstream? This is inconsistent with the "slowed sufficiently" concept. These modeling inconsistencies have to be addressed in the report.

Skookum Reach appears to be anomalous. In many different places throughout the TMDL report the Skookum Reach appears anomalous. Somehow in the modeling it is presented as having a very substantial heat increase in a short distance compared to the upstream Dalkena Reach, and then loses that substantial increase by the time it reaches the next downstream Kalispel Reach. The upstream and downstream reaches both show that the existing conditions are cooler than the natural, yet in Skookum Reach it shows that the natural conditions are cooler than the existing. PNC believes that this oddity does not make sense.
An explanation for how this could be true would help. If it results from some error either in programming or in data, then the problem should be corrected and new figures and tables prepared. If no explanation is possible, then there should be an admission that it doesn't make sense, that Skookum Reach probably really does meet the temperature criteria, and that the glitch does not seem to affect the rest of the downstream presentations.

Kalispel Tribal Waters

Page 28, Peak temperature analysis methods-Kalispel tribal criteria, First Paragraph: Why was a different methodology of summarizing the cumulative frequency of water temperatures used for the Kalispel Tribe river reach? Why not use the entire Kalispel Reach, which encompasses all tribal lands, instead of a single upstream segment of the Skookum Reach and a single downstream segment of the Middle Reach?
Page 30, Data filtered, First Paragraph: Why use only data from segments 115 and 172 for the cumulative frequency analysis? Segments 115 and 172 bookend the Kalispel Reach, so why not use the Kalispel Reach instead of changing the methodology. The reason for the change in methodology needs to be explained in the document.

Page 51, Kalispel tribal criteria: Explain the large difference in the natural river temperature between segment 115 and 172. The existing river shows little change in temperature between segments 115 and 172 while the natural river warms up between segments 115 and 172.

The Draft TMDL does not explicitly state how Ecology‟s proposed load capacity, WLAs, and LAs will meet Kalispel water quality standards at the jurisdictional boundary.

The Draft TMDL must ensure that target temperatures for the jurisdictional boundary are based on Kalispel water quality criteria and paired analysis rather than state criteria and CFA methodology. Any NPDES permits issued under the auspices of the TMDL must be developed in accordance with such target temperatures. At a minimum, the permits should prevent the degradation from getting worse by each discharger and require periodic engineering evaluations looking for opportunities to reduce heat loads.

Kalispel analyses show that there are violations of Kalispel water quality standards at and just upstream of tribal waters in both 2004 and 2005. Ecology‟s current CFA analysis results in erroneous conclusions about compliance with both tribal and state temperature criteria.

Instead of addressing noncompliance with tribal water quality standards, the Draft TMDL asserts:
The loading capacity will defer to the Washington State criteria as opposed to designating entirely separate ones based on the Kalispel tribal criteria. This is because this TMDL only applies to Washington State waters. Moreover, the application of both Washington State and Kalispel tribal criteria to Pend Oreille River temperatures identified similar heating patterns in the coincidental reaches and segments examined.
This explanation is inadequate for two reasons. First, the fact that the TMDL only applies to state waters does not relieve the State of its obligation to ensure that Kalispel water quality standards are met at the jurisdictional boundary. Second, the Tribe objects to the assertion that compliance with its water quality standards can be derived from the CFA methodology set forth in the Draft TMDL. To avoid authorizing violations of Kalispel WQ standards, the Draft TMDL must ensure that target temperatures for the jurisdictional boundary are based on Kalispel water quality criteria and paired analysis rather than state criteria and CFA methodology.
Page 72, second paragraph: The TMDL must explicitly state how Ecology‟s proposed load capacity, WLAs, and LAs will meet Kalispel water quality standards at the jurisdictional boundary. Kalispel analyses show that there were violations of Kalispel water quality standards at and just upstream of tribal waters in both 2004 and 2005. Ecology‟s current CFA analysis results in erroneous conclusions about compliance with both tribal and state temperature criteria.

The current statement in the draft TMDL below is not adequate.
“The loading capacity will defer to the Washington State criteria as opposed to designating entirely separate ones based on the Kalispel tribal criteria. This is because this TMDL only applies to Washington State waters. Moreover, the application of both Washington State and Kalispel tribal criteria to Pend Oreille River temperatures identified similar heating patterns in the coincidental reaches and segments examined.”
This TMDL may only apply to Washington State waters but where those waters meet the Kalispel waters they must meet the Kalispel Tribe‟s standards. Thus the TMDL must demonstrate that the Tribe‟s standards will be met at the boundary.

Allocations

Page 71, Equation 1: The use of a grid cell based definition for daily maximum temperatures is not consistent with the loading formulation presented in Equation 1. The application of a volume weighted daily maximum temperature is consistent with this equation and would also more appropriately reflect the dominant aquatic habitat in the Pend Oreille River.
Pg xiii, paragraph 3, Allocations - Tributary and mainstem shading: It is unclear the above conditions are expected to occur in tributaries to the Pend Oreille River under the current state forest practices rule which allows the removal of all riparian vegetation along intermittent streams and up to 30% of the riparian vegetation along non-fish bearing perennial streams.

Page 73: Table 11 … Part 2, last 4 rows do not meet criteria in 2005, but no level of exceedance values in 2005??

Page 77: Table 13 provides needed increases in height and % canopy cover, however there is no relative value to compare against. Is there a specific cover or height for all reaches or does each reach have its own value?

Page 96: 1) Standards are to be met in ten years. If shade is a component, then there are 50 years. This appears to be a discrepancy.

When setting pollution Load Allocations (LAs) and Waste Load Allocations (WLAs), the Draft TMDL must account for the cumulative impacts of all sources of upstream heating, particularly where the timing of such impacts is critical to bull trout migration.

There is much confusion in the document about the use of the allocations, then inferring temperature reductions, but with no river flow, temporal, or atmospheric conditions associated with declaration of the values. Load allocations need to be determined for all seasons using the correct measure of thermal impact that doesn‟t bias the conclusion and then allowable pollutant loadings under TMDL design conditions must be clearly expressed. There are violations of both parts of the existing special criteria in most reaches of the river, including those at, and upstream of, Kalispel waters, when evaluated with the direct daily comparisons.

TMDLs for Pend Oreille tributaries must include all streams and use the correct Char-based temperature criteria, where appropriate, and apply criteria to the entire tributary length. All tributaries to the Pend Oreille River used as part of the LAs for the mainstem Pend Oreille draft TMDL must have complete and valid TMDLs. The TMDLs need to establish appropriate target shade requirements based on the correct use-based criteria for each tributary regardless of land ownership.

Page xiii, second paragraph - The permitted point source loads need to be subtracted from the total load capacity and tracked as measurable sources of thermal pollution to the river. If small sources of theoretical shade are being tracked and accounted for, so should all wastewater discharges of heat.

There is no evidence, or plan, that suggests that LAs given to dams can be met. The existing heat load from point sources needs to be fixed at existing levels and not allowed to increase for possible expanded future flows. There is no room for growth, as the reserved capacity for permitted point sources‟ thermal loads indicates, unless it can be demonstrated that there is some sort of a plan and reasonable assurance the dams will be able to meet the correct LAs using the direct daily analysis.

There needs to be a clear basis documented for how each tributary LA was derived from shade potential and how that LA and required shade potential achieves the char-based water quality criteria within each stream. These new LAs and target shade potentials need to be compared to those adopted under the Colville TMDL and explain why changes were, or were not made to each.

Page xiii, fourth paragraph: There is no room in the total load capacity for reserved capacity assigned to future pollution growth since there is no reasonable assurance or any plan that the LAs given to the dams can ever be met.

Page xiii, fifth paragraph: “Reasonable assurances” does not just mean that there is another potential regulatory process. There needs to be a plan that has a reasonable potential to lower pollution and achieve the allowable thermal load capacity when it is implemented. The FERC action plan refers to a process, but no remedy is even remotely identified to meet the LAs for dams. Therefore, the other allocations, reserve capacity, and margin of safety are all arbitrary values.

Page 3, Surrogate Measures Section: The thermal loading in allocations was originally proposed in the first draft TMDL and a similar approach in this draft needs to be retained. Elimination of allocation loads does not provide more meaningful or measurable pollutant loading targets. While the heat load allocation derived at the TMDL design conditions can be converted to a potential temperature compliance value under a certain flow condition, it does not mean the expression of allowable loading should be eliminated from the TMDL. Currently there is a mix of temperature targets being called loads, and temperature reduction values being called allocations, with no explanation of why the thermal loading approach used in the previous draft TMDL needed to be abandoned and no explanation of why this was done without any discussion with the MOA participants.

Page 71, “surrogate measures”: The complete abandonment of quantifying heat load and instead using just temperature for allocations is neither justified nor appropriate. The report is confusing about load capacity, allocations using temperature reductions, temperature targets, and how, when, and under what kind of river conditions they would apply and how reductions might be quantified by source.

Page 74-75, NPDES permitted waste load allocations: Ignoring permitted heat contributions and not reducing the hydropower LAs is inappropriate as is giving allowances for expansion of heat discharges in a fictitious reserved capacity.

Page 78-79, Hydroelectric Facilities load allocations: Allocation of 0.24°C allowable increase to Washington dams is inappropriate since there are upstream heat sources and wastewater sources contributing to warming above natural conditions and the CFA methodology has systematically underestimated the actual thermal impairment present under existing conditions in Kalispel waters and at Box Canyon dam.
Page 79, Reserved Capacity: There is no plan that suggests how the dams will meet the already inflated allocations. Therefore fabricating reserved capacity to allow wastewater dischargers to increase thermal pollution is not warranted.
The Part 1 load allocation to the Boundary facility should acknowledge the cumulative effect of Box Canyon in the Boundary forebay reach. Assuming that the load allocation of 0.12oC to each hydropower facility is reasonable, SCL has concerns about the TMDL's application of the allocation at the Boundary forebay. Specifically, SCL is concerned that the allocation as calculated ignores the effect of Box Canyon on temperature conditions in the Boundary reaches that the report elsewhere acknowledges.1 This issue becomes relevant in the TMDL's establishment of the temperature reductions necessary to meet the load allocation. Whereas the TMDL currently indicates that O.88oC of temperature reduction is required at the Boundary forebay to meet the allocation (i.e., to achieve temperatures of Natural + O.12oC), SCL believes that the reduction required should be O.76oC (i.e., to achieve temperatures of Natural + O.24oC, which would be the cumulative allowance at this location, calculated as the sum of the 0.12°C allowance to Box Canyon carried downstream and added to SCL's 0.12°C allowance). This issue appears at p. xii, p.79, and in Tables 15 and 17 (p. 80 and 95, respectively) of the TMDL. The text of the TMDL at pages xii and p. 79 should be revised to state that a reduction of O.76°C is

Assuming that the Part 2 criteria apply (see SCL General Comments), the TMDL's discussion of the Part 2 load allocation should be more clear that the allocation is set for each reach (not source), and that all parties' actions will cumulatively help achieve temperature reductions. The required reductions for Boundary reaches are a result of actions throughout the river, and the Part 2 reductions in the Boundary reaches are expected to be fulfilled by the cumulative benefit of actions taken by all parties. The following new sentence should be added to page 79, at the end of the last paragraph in the section "Hydroelectric facilities:" "The temperature reductions needed to achieve the Part 2 load allocations in each reach would be shared between the two hydropower facilities based on responsibility."

Page 75. PNC agrees with the modeling showing that the NPDES permitted point sources (including PNC) have "no definable influence on existing temperatures." Setting a limit based on the present effluent temperature limit and maximum flow makes sense. The method for translating such information to a kilocalories per day limit appears reasonable. PNC notes that the flow used for PNC was 0.228 m3/sec (or 5.20 mgd) and asks the basis for using 5.20 mgd. PNC's current permit does not have a flow limit, and the fact sheet for PNC's current permit shows a maximum flow of 5.7 mgd between January 2003 and July 2006. (Fact Sheet, table 1 pg 5.) PNC requests that the kilocalories per day limit be recalculated based on the present effluent temperature limit of 90°F and a flow of 5.7 mgd.

Stateline Allocation

Page 73, Load and Wasteload Allocations, Idaho-Washington Stateline: Please explain how the temperature allocation for water temperatures at the Idaho-Washington state line based on observed conditions in 2004 will be applied. There will be years where water temperatures will be much warmer than presented in Figure 32 at the Idaho-Washington state line. We recommend dropping the reference to a specific year and referencing the maintenance of existing water temperature conditions in the Pend Oreille River at the state line.

It appears that Idaho communities may have been given no opportunity for growth. This appears to be the result of the requirement that the summer/fall critical periods temperature at the Idaho/Washington border be maintained and Washington communities being given waste load allocations. I question whether the State of Washington can regulate permitted point sources in the State of Idaho.

It seems disingenuous to allocate all the benefit from Albeni Falls Dam to the downstream users to "ensure viability of load and wasteload allocation established for downstream locations". The allocation at the state line should be the heat at natural conditions plus a portion of the load capacity allowance for existing use and growth. It is difficult to imagine but should the dam ever be removed, the TMDL would force Idaho users to cool 100% of the river even if no discharge was received upstream of the state line mostly for the benefit of downstream dischargers. Additionally, there may be some natural phenomenon that causes the water temperature at the state line to increase which Idaho dischargers have no control over yet would be responsible for mitigating. Idaho cannot be liable to mitigate a natural phenomenon.

Anti-degradation policies come into play during the permitting process where socioeconomic factors can also be considered. Limiting the heat at the state line to 2004 values in a TMDL would prevent the consideration of socio-economic factors.

A TMDL should establish the loading capacity of a water body. No effort was made to estimate the loading capacity at the state line.

It is our understanding that the Idaho dischargers do not influence the temperatures measured in the Pend Oreille River (from the CE-QUAL modeling), as mentioned in the report. It would be nice if the report expanded on this topic to state that heat limits on the Idaho dischargers are not required to meet Washington water quality goals and beneficial uses.

Accounting for upstream thermal impacts from Idaho is similar to the approach addressing cumulative impacts of pollutant sources flowing into Washington from Idaho in the Spokane River Dissolved Oxygen TMDL (USEPA, 2008). Therefore, the Draft should be revised to fully consider the impacts of the Albeni Falls Project, including the Project‟s late-summer contribution to downstream WQ violations.
Page xii, first paragraph - Setting the allocation for the Stateline at 2004 conditions is inappropriate since excess heat flowing downstream in late summer is contributing further degradation downstream. The additional heat is contributing to temperature violations in WA and Kalispel waters detrimental to recovery of native trout populations.

Page 73, Idaho-Washington Stateline - The Pend Oreille River water entering Washington is not cooler in late summer and only the use of CFA methodology makes it appear to be cooler. An allocation for "maintenance of existing condition temperatures observed in 2004" does not account for significantly warmer average river temperatures contributing to downstream violations during critical conditions in late summer.

The draft TMDL provides a load allocation to the State of Idaho. Washington, however, has no authority to provide allocations to sources in Idaho. Please remove the reference to an allocation to sources in Idaho.

The load allocation at the Idaho-Washington border as described on page 73 of the Draft Pend Oreille Temperature Water Quality Improvement Report is for the maintenance of existing condition temperatures as observed in 2004. Idaho cannot be accountable for climatic or other nonhuman-induced conditions that could increase water temperatures within the Pend Oreille River above temperatures Observed in 2004. Such conditions are beyond the
control of sources in Idaho.
Additionally, Idaho CE-QUAL-W2 modeling results evaluating the effect of NPDES permitted facilities on temperatures in the Pend Oreille River are consistent with those reported on pages 59 and 67 of the Draft Pend Oreille Temperature Water Quality Improvement Report. Both results indicate that NPDES-permitted discharges have no measurable influence on existing maximum temperatures observed in the Pend Oreille River. As such, temperature limits on Idaho discharges are not required in order to meet Washington WQS. The TMDL should reflect this fact.

Colville National Forest TMDL

This document covers the Pend Oreille River and tributaries up to the Colville National Forest boundary. Are the portions of these tributaries on private and state lands within the Colville National Forest boundary covered in the TMDL for the Colville National Forest, this document or another document?

The previously adopted Colville Forest temperature TMDL, Detailed Implementation Plan, and Colville National Forest Plans, were all drafted without using the appropriate Char usebased criteria of 12°C in the Pend Oreille watershed.

Because there are errors and inconsistencies in the stream names and designated uses, all tributaries to the Pend Oreille River need to have reconfirmation of the appropriate use-based criteria for each stream and have the subsequent target shade requirements revised to meet the designated Char use-based criteria. The criteria and revised tributary TMDL must be applied to the entire stream.

Page xiii, third paragraph: Any existing TMDLs and associated allocations with safety margins for the Pend Oreille tributaries without Char-based criteria need to be voided immediately and redeveloped for the entire length of each stream following appropriate administrative procedures for establishing a TMDL.

There appear to conflicting conclusions for the impact of shading effects in tributaries, the amount of shade potential which will be needed, and which TMDL for temperature will regulate shade requirements in tributaries.

Apparently, the Colville Forest TMDL for temperature was submitted and approved by EPA in 2005 without using the appropriate char use-based temperature criteria for Pend Oreille tributaries (12°C), even though they were promulgated by the State in 2003. The Colville Forest TMDL used 16°C to develop shade targets to delist these tributaries. The TMDL was then used to develop a detailed implementation plan in 2005 and the USFS Colville Forest plans in 2006; those plans helped exclude listing of critical char habitat on federal land. Because the Colville Forest TMDL used the wrong temperature criteria for Pend Oreille tributaries with Char-based uses, the streams need to be placed back on the 303(d) list and TMDLs redeveloped for the entire length of each stream following appropriate administrative procedures for establishing TMDLs.

The required levels and shade potential in current LAs are inconsistent with, and apparently in some cases less stringent than, the levels and shade potential needed to meet char usedbased criteria; those used in the Colville Forest TMDL are no longer valid. There is neither justification for the shade targets identified for tributaries nor any citation to a technical report which documents adequate analyses for establishing multiple temperature TMDLs in bull trout habitat, including all the required components of an approvable TMDL including margin of safety and public participation.

Because the Colville Temperature TMDL used out-dated temperature criteria, a concise statement needs to be made that explains both the validity of the Colville Temperature TMDL for most Pend Oreille tributaries and how each of the shade potential for each tributary was derived for the new proposed Pend Oreille TMDLs.

Page 77, Tributary Shading: Reference to an invalid Colville National Forest TMDL that did not use Char-based criteria to develop allocations is inappropriate. All char streams delisted using the adoption of Colville Forest TMDL must be relisted on the 303(d) list. All tributaries designated as Char waters need to be reassessed for their entire length with appropriate revised shade requirements to meet the 12°C criteria, including an evaluation of the margin of safety, with public review.

General

From my understanding of the water quality modeling that Army Corps of Engineers and the State of Idaho have accomplished, temperatures now are lower than under pre-dam natural conditions. For this reason, why even develop a temperature TMDL?

It is obvious from the above statements that the WDOE considers effective shading to be key in meeting state water quality standards for temperature on tributaries to the Pend Oreille River. In the Colville National Forest TMDL report excerpt above, WDOE states that "an effective shade level of 80 percent is needed to maintain maximum water temperatures at or below 16oC". Yet the Forest and Fish Rules allow the harvest of up to 30% of riparian vegetation along non-fish bearing, perennial streams and complete removal of the riparian vegetation along intermittent streams.

Taken as a whole, the requirements for hydroelectric project licensees and the Colville National Forest, to address compliance with state water standards, appear to be more stringent than those listed for private timberland owners under the Forest and Fish Rules. This apparent uneven application of WDOE‟s authority to enforce the Clean Water Act needs to be addressed in this TMDL. Specific changes to Forest and Fish Rules will need to be made if effectiveness monitoring indicates that their application is causing an adverse effect to state water quality standards. This needs to be part of this draft TMDL language in order
to be consistent with what is required of other entities and agencies.

Page xiii, sixth paragraph: Wastewater point source permits must address impacts to temperature within both parts of the temperature criteria, not just when it exceeds 20°C. There should be a permit condition that fixes thermal loads at current conditions and requires point sources to periodically look for ways to reduce their thermal load over time.

The Draft TMDL must ensure that target temperatures for the jurisdictional boundary are based on Kalispel water quality criteria and paired analysis rather than state criteria and CFA methodology. Any NPDES permits issued under the auspices of the TMDL must be developed in accordance with such target temperatures. At a minimum, the permits should prevent the degradation from getting worse by each discharger and require periodic engineering evaluations looking for opportunities to reduce heat loads.

Page 81, Reasonable Assurances - There is no substantive plan provided on how the TMDL will be met. Providing reasonable assurances means that there should be a general idea of how the TMDL will be met and how implementation is assured to achieve compliance with WQ standards. Currently there is only a reference to a process with no foreseeable solution for the dams to achieve the required thermal impact reductions that are needed to meet the total thermal load capacity of the river, let alone provide capacity for wastewater discharge expansion and provide a margin of safety. Referring to a FERC process, with a continuous deferral of achieving the temperature criteria built into the state‟s WQ standards, is not adequate for restoring native trout back to the river and Kalispel people.

Response

You are correct that the memo from the Attorney General‟s Office in Appendix F defines "T" as the background temperature measured at a point unaffected by the discharge. The memo goes on further to state "Since you are developing a TMDL that evaluates the impact of several point and nonpoint "discharges" the most logical point to evaluate "T" is at a point unaffected by the discharges within the scope of the TMDL (i.e. the most upstream discharge)." In applying "T" to this TMDL, Ecology determined that because the Pend Oreille River is affected by discharges from dams in Washington and Idaho, the most appropriate representation of the unaffected river was to use the modeled natural condition data set. Using the modeled natural condition to define "T" also adds a margin of safety to the TMDL. We added language to clarify the definition of "T" at pages 7, 25, and 31 so that the reader understands how "T" was determined. wqs

The objective of TMDLs is to improve water quality so that the stream, river or lake will meet existing, EPA-approved water quality standards. The current designated use for the Pend Oreille River is salmonid spawning, rearing, and migration. A revision to the water quality standard rule (WAC 173-201A) would be needed to designate the Pend Oreille River for bull trout migration. Ecology initiated a Triennial Review of the state water quality standards in November 2010.
The Triennial Review process is required by federal law and provides a forum to discuss changes to or issues with the water quality standards and their implementation. The Kalispel Tribe formally commented as part of this review process on December 17, 2010, and we note that this is the appropriate forum to seek designated use changes affecting the Pend Oreille River. For more information about the water quality standard Triennial Review process visit: http://www.ecy.wa.gov/programs/wq/swqs/triennial_review.html. wqs

Ecology‟s letter of January 28, 2008 indicated that the state will use the TMDL process to model the natural thermal condition of the rivers with special temperature provisions. The intent of Ecology‟s letter was to ensure that if the TMDL found that the natural condition of the river was cooler than the special condition criteria, then the cooler natural condition would become the effective criteria target for the TMDL, and all point and non-point source allocations would be based on attaining these criteria. In fact, the TMDL for the Pend Oreille River found that the natural condition temperatures are warmer than the 20oC special condition temperature criteria, and therefore based the WLA and LAs on this finding. wqs
We are not aware of any errors and inconsistencies in the Pend Oreille watershed that would have negatively impacted the development of the Pend Oreille River temperature TMDL. Ecology is in the process of revising the water quality standards rule to fix minor typographical errors. For more information on the rule making visit http://www.ecy.wa.gov/programs/wq/swqs/RuleRev2011.html. See also Colville National Forest TMDL question # 3. wqs

Ecology‟s long-standing policy with implementing water quality programs, such as TMDLs and NPDES permitting, is to not delay activities because a future rule-making may change criteria or standards affecting that activity. Putting activities on hold for this reason would needlessly delay pollution control required by federal law to bring a river, stream, or lake into compliance with water quality standards. Ecology describes how TMDL work will be considered when a rule-making is about to go into effect. For an example of how Ecology manages TMDLs in light of rule changes, see page 4 of the Implementation Plan developed for the 2006 water quality standards approval:
http://www.ecy.wa.gov/pubs/0610072.pdf. We also note that the Triennial Review process provides a forum to discuss changes to or issues with the water quality standards and their implementation. Ecology initiated a review process of the state water quality standards in November 2010. The Triennial Review is not a rule-making process, but may lead to developing guidance or future revisions to the standards. For more information about the water quality standard review process visit:
http://www.ecy.wa.gov/programs/wq/swqs/triennial_review.html. wqs

You are correct that the Pend Oreille River is not designated for char spawning and rearing. The TMDL evaluated compliance with the temperature standard consistent with the Attorney General Office memo in Appendix F. This memo states that the TMDL must apply load allocations and wasteload allocations when the Pend Oreille River is below 20oC to ensure that the temperature in the river is not raised more than that allowed by t = 34/(T+9). Therefore, the criteria that results from this equation applies year round for the Pend Oreille River. Ecology established a fall critical period until river temperatures cooled to 12oC to provide additional protection for potential bull trout migration. At 12oC all aquatic species in the river would assumed to be protected. wqs

Ecology sought legal counsel for interpreting this part of the special condition in Table 602 for the Pend Oreille River so that the resulting TMDL would be legally defensible. Please see Appendix F, which provides the Attorney General memo that we followed. The memo from the Attorney General‟s Office in Appendix F defines “T” as the background temperature measured at a point unaffected by the discharge. The memo goes on further to state “Since you are developing a TMDL that evaluates the impact of several point and nonpoint „discharges‟ the most logical point to evaluate „T‟ is at a point unaffected by the discharges within the scope of the TMDL (i.e. the most upstream discharge).” In applying “T” to this TMDL, Ecology determined that because the Pend Oreille River is affected by discharges from dams in Washington and Idaho, the most appropriate representation of the unaffected river was to use the modeled natural condition data set. Using the modeled natural condition to define “T” also adds a margin of safety to the TMDL. wqs

The Idaho model was discussed briefly on page 19 in the TMDL under Model Calibration. Ecology added information about the Idaho model on page 16 and 19 of the TMDL. lc

Ecology used Portland State University‟s 2006/2007 model for the Pend Oreille River in Idaho for the upstream boundary condition. Ecology did not use the U.S. Army Corps (Corps) model for this portion of the river because peer-reviewed results were not available at the time we performed the TMDL analysis. Ecology was made aware that draft results of the model were available in Sept. 2009, but the USGS peer review and report was not available until June 2010. Ecology did not receive copies of the peer review or model report. The PSU model continues to provide reasonable temperature predictions.

A discussion of model accuracy is included on page 19 of the TMDL. The results indicate that the models were well-calibrated and the quality of the model results are acceptable for use in the TMDL. Since the water quality criterion is expressed as an allowable increase above the natural condition, the model is a necessary tool for estimating pollution levels that will achieve water quality standards. Ecology believes the model is adequate to establish allocations, and while we recognize the uncertainty in model predictions, we also believe the modeling results provide the best available information for developing the TMDL. The prediction error of the model is important to evaluate and minimize to the extent feasible, but it is not directly relevant to the use of the model to evaluate the 0.3oC temperature threshold. This is because the 0.3oC effect is evaluated using the difference between two nearly identical model simulations, isolating the effect of a subset of model inputs (e.g., river geometry changes due to dams) on temperature. The error in that estimate is not the same as the difference between measured and simulated temperatures for the model as a whole. In addition, uncertainty in a TMDL is accounted for in the margin of safety as specified in the Clean Water

Response: The TMDL analysis compared modeled existing temperatures to modeled natural condition temperatures, which is described in the TMDL Analysis section of the report. To estimate natural conditions with the CE-QUAL-W2 model, categories of human impacts were identified that were most likely to have altered temperature regimes and then removed from the model. Natural conditions for these impacts were determined as follows:

Upstream boundary conditions were based on the results from the natural conditions modeling scenario for the next upstream model. For example, the natural condition output from the Idaho model was used as boundary conditions for the Box Canyon model.

Tributary temperatures were modeled with rTemp using Potential Natural Vegetation.

Point source discharges were removed.

Mainstem riparian shade was set to Potential Natural Vegetation.

Downstream impoundments (i.e. the dams) were removed.

Separate modeling scenarios were developed for each of these impacts set to natural levels, and then a “natural conditions” scenario was developed with all impacts set to natural levels. Due to the complexity of the changes and a lack of information regarding pre-development conditions, some other human-related changes were not evaluated under the natural condition scenario. For example, changes in mainstem channel geometry or changes in climate were not analyzed. Also, the natural hydrologic and geomorphologic conditions of the tributaries were not estimated.

The reason why the model is calibrated to provide the best fit between predicted and measured temperatures for the entire study period, and not just a particular time segment, is because the Pend Oreille River temperature criteria applies throughout the year. For this reason, model calibration must reflect this perspective. Also, any seasonal uncertainty in model calibration is minimized by the process of comparing the difference of two model scenarios.

See response to question 3 in this section. Model error can be positive or negative, so using the example provided, the error would be +/- .4oC. Therefore, in subtracting one model scenario for another, it‟s most likely that the error is less than .4oC (assuming bias in both results subtract from each other). There is still a small possibility that the error could equal the "added in quadrature" value cited. However, that error is equally likely to under-predict the true level of impairment (i.e. show less impairment than actually exists) as to over-predict an impairment (show more impairment than actually exists). To address this, TMDLs require a margin of safety (MOS) to ensure we do not under-predict the impairment. If impairment possibly is overpredicted, then that can be included as part of the MOS for protecting the water quality standards.

Comment Noted

The model used by the TMDL averages temperature within each cell. One cell extends from stream bank to stream bank, downstream for about one hundred meters (or one segment), and one meter deep. So, each one-hundred meter long river segment has many 1 meter deep cells stacked on top of each other equal to the depth of the river. The river segments were then grouped into reaches (see Table 5 in the TMDL). Ecology determined which cell had the highest, or maximum temperature, within each segment for every day during the summer and fall critical periods. So, for each day, every reach contains the same number of maximum temperatures as there are segments. Ecology did not use a volume or flow-weighted average temperature.

The maximum temperatures used in the TMDL analysis considered all segments, for each day of the analysis period, for all the scenarios modeled.

The standard for the Pend Oreille River is a daily maximum, so the TMDL analysis focused on daily maximum temperatures. Since the river is well-mixed, warmest temperatures typically occur within the top one meter, but not always. Conducting the TMDL analysis using one-meter-deep cells at the surface is consistent with Ecology‟s general approach to developing TMDLs. Because modeling for TMDLs must consider critical conditions, assumptions made for modeling are not necessarily the same as those used for monitoring.

The TMDL does not assume the thermal load from Idaho is equivalent to natural conditions. Our analysis shows existing temperatures flowing across the Idaho-Washington state line are cooler now than they were before Albeni Falls Dam was constructed. Therefore, the Pend Oreille River at the state line meets the temperature water quality standard, and the goal of the TMDL is to maintain that compliance into the future. The Nov. 26th Keta Waters Report appears to have analyzed the difference between the U.S. Army Corps of Engineers (Corps) model and the Portland State University (PSU) model for the Pend Oreille River in Idaho. The report states the Corps" model shows an average difference of 0.9oC and a maximum difference of 2.3oC between natural and existing conditions. The report fails to state where the maximum temperature difference occurred; was it in the Albeni Falls Dam forebay or at another location? The report also did not mention the PSU model"s average and maximum difference between existing conditions and natural conditions. However, the report did show there is only a 0.19oC difference between the Corps and PSU models for average natural condition temperatures Ecology used the PSU model to establish background conditions for [illegible] interpret the output from the model. These decisions center on the issue of how to aggregate (combine) data over time and space. Data aggregation decisions are made on a case-by-case basis in TMDLs based on a variety of factors, including the pollutant of concern, language of applicable water quality criterion, type of water body, model output complexity, and margin of safety concerns. Ecology believes the modeling analysis done for the Pend Oreille TMDL is scientifically defensible and we do not agree with the assertion that the cumulative frequency distribution method hides late summer thermal impacts. In addition, EPA has approved the use of the cumulative frequency analysis in TMDLs for other impounded systems, such as the Willamette River temperature TMDL. The cumulative frequency analysis approach was chosen to address the changed hydraulic condition of the Pend Oreille River now, with hydroelectric facilities in place, in relation to a natural condition or a hydraulic condition present prior to the hydroelectric facilities. Within the study area, the Pend Oreille River is affected by three hydroelectric facilities: Albeni Falls in Idaho, the Box Canyon and Boundary dams in Washington. Cumulatively, these facilities have altered the natural flow conditions by storing more water and, therefore, creating a greater channel volume (greater water width and depth,) which in turn has reduced the overall velocity or rate that water flows through the study area. Prior to hydroelectric power generation, particularly during the warmest summer months, when the greater water temperatures occur, the river flow was shallower and narrower. These hydraulic differences between the pre- and post-hydroelectric conditions affect the rate of travel (for more on hydraulic lag, see response to question 7 in this section). The temperature criteria that applies to the Pend Oreille River is based on the comparison of the current temperature condition to the natural temperature condition. Given the hydraulic differences between the current and natural flow conditions, a direct time-based comparison, such as a day-to-day comparison of temperatures, was not deemed appropriate. This is because applying a time-based comparison at common locations results in comparing waters that have been exposed to different heating patterns. For this reason, Ecology chose the cumulative frequency approach for this analysis. The cumulative frequency-type analysis also

Although general patterns in travel time changes (average velocity) between the natural and existing condition scenarios can be observed by comparing daily temperature (for instance, comparing the timing of seasonal temperature peaks at a particular river location), the results are approximate. The CE-QUAL W2 model, in addition to predicting temperature, also provides information on flow characteristics, including velocity. The results indicate that the change in travel times between the current and natural conditions, depending on the location and flow condition, can vary on the order of hours to days. Battelle‟s Pacific Northwest National Laboratory calculated that the time of travel through the Boundary Dam reservoir is about a half day under natural conditions, whereas with the dam in place the travel time is approximately two and a half (2.5) days (Breithaupt et al., 2008). In addition, Boundary Dam is operated in a peaking mode (discharging high flows during the day and near-zero at night), and Box Canyon is a run-of-the-river operation. The cumulative frequency distribution minimizes these differences and allows different hydrologic conditions to be compared. These travel time differences are why a direct time comparison of temperatures between the natural and [illegible] approach used to derive them is acknowledged. As discussed in responses to questions 6 and 7 in this section, the method of comparing natural and existing temperatures, at a set location on the river, using the same time-frame (i.e. day-to-day), is not an appropriate approach due to differences in travel time, which in turn affect heating influences. Nevertheless, the cumulative frequency analysis approach applied in the TMDL analysis and the day-to-day comparison approach both identified the exceedance of temperature criteria at the Box Canyon forebay location as well as the upstream boundary of the Kalispel Tribe Reservation. So, it is not correct to suggest that the cumulative frequency method “masks” criteria exceedances. Ecology disagrees that the cumulative frequency distribution method applied in the TMDL fails on scientific grounds. The methods used by Keta Water‟s to critique the cumulative frequency approach were confusing and highly biased. The analysis methods outlined in an August 10, 2010 memo from Keta Waters to Ken Merrill of the Kalispel Tribe indicated that a synthetic series of existing temperature conditions were developed by adding 1oC to the natural temperatures for model segment 115 after August 1, 2004 (page 7). On the following page, the memo indicates that the natural temperatures at segment 115 are the same as the existing temperatures prior to August 1, 2004 and are 1oC cooler beginning August 1st. Despite this confusion, it is believed that the analysis took the form of setting the natural and existing daily maximum temperatures at equivalent levels by location (segment) and date for the Skookum reach. (The Skookum reach is comprised of 29 segments.) Then the natural condition temperatures at segment 115 were decreased by 1oC following (or on) August 1st. This decrease in temperature was used to indicate a situation of criteria exceedance. Once these data changes were made, a similar analysis method as used in the TMDL was applied with the finding that in only one instance was the temperature criteria exceeded. These methods used to critique the cumulative frequency distribution method were biased. For instance, 98% of 1784 daily maximum temperatures represented by the natural data set for the Skookum Reach were assumed to be equal to the existing dataset. Assuming that the distributions are equivalent for 98% of the data undermines the intent of the

Regarding the reason why the cumulative frequency distribution method was used to evaluate water temperatures in the Pend Oreille River, please refer to the response to questions 6 through 8 in this section. Ecology disagrees that the CFA method ignores changes in water temperatures that are temporally and spatially dependent and biologically important to migrating species, particularly bull trout. A specific time frame of concern is late summer, when thermal barriers will likely delay the migration patterns of threatened bull trout. Regarding temporal aggregation, bull trout migrate in late summer and fall, and the TMDL recognizes changes in timing by establishing a summer and fall critical period, which were analyzed separately. The summer critical period is during July and August, while the fall critical period is September through October. These critical periods align with the temperature standard for the Pend Oreille River, and the temperature standard protects designated uses of the river. Regarding spatial aggregation, the vertical variation is entirely captured (no aggregation) and the horizontal segmentation is a reasonable balance between the goal of maintaining simplicity in the TMDL allocations and the need to account for variation in river characteristics. The allocations will also work in concert to address ecological impacts. For example, increases in canopy cover and tree height were determined for riparian vegetation on both sides of the Pend Oreille River. These allocations for additional mainstem shade were predicted to only slightly decrease overall river temperatures, but they were also established to protect cold water inputs into the river, lower temperatures near the shoreline, and provide fish habitat, thereby providing a migration corridor for bull trout. Combining the allocations for mainstem shade, tributary shade, NPDES permittees, and the dam forebays is projected to improve habitat requirements for bull trout migration.

See responses to questions 6 through 9 in this section.

See responses to questions 6 through 8 in this section.
See responses to questions 6 through 8 in this section. Ecology calculated the full temperature profile differential using an average for informational purposes only. To set the TMDL allocations, Ecology used the maximum temperature difference between the natural and existing condition.

See responses to questions 6 through 8 in this section.

See responses to questions 6 through 9 in this section

See responses to questions 6 through 9 in this section.

See responses to questions 6 through 8 in this section.

Refer to the "Analysis Period and its Characterization" section in the TMDL (pages 20-21) for a discussion of the flow and air temperature conditions characterizing the summer months of 2004 and 2005. (The annual peak water temperatures for the Pend Oreille River occur from mid-July to mid-August.) In summary, flow levels during the summer of 2004 were below average, with the daily average flows for June and July at the 13th and 29th percentiles based on the 55-year record. Flow levels for the same period in 2005 were observed at the 29th percentile.
Air temperatures were warmer during the summer months in 2004 in comparison to 2005 with daily average temperatures exceeding the 90th percentile, based on observations from the 1996-2009 period, 24 days or 26 percent of the time. In comparison, the summer of 2005 was cooler, with only 3 days (3% of the days) exceeding the 90th percentile based on the same record. Both the lower flow conditions and warm air temperatures (a surrogate for solar shortwave radiation levels) combined led to more elevated water temperatures in 2004 in comparison to 2005, and is the reason the TMDL allocations are based on 2004 conditions.

See responses to questions 6 through 9 in this section. Hydropower operators are required to complete all reasonable and feasible actions to meet the temperature criteria. Ecology does not consider these actions to be mitigation.

Ecology disagrees with this assessment of the TMDL analysis. See responses to the questions 6 through 8 in this section, as well as response to question 9 under the Allocations section of this Response to Comments.
A margin of safety for the cumulative frequency distribution was provided by analyzing:
The two critical periods separately.
Only those temperatures that exceeded the 20oC criteria within each critical period.
River reaches independent of each other. The average reach size is 5.8 miles.
These factors result in a margin of safety because a specific and narrow dataset was analyzed with the cumulative frequency distribution, rather than including cooler temperatures that would have skewed the results toward compliance. In addition, as described on page 81 of the TMDL, Ecology provided a margin of safety by analyzing a hot weather/low flow year (2004), using conservative model assumptions and water quality standards interpretation, and establishing conservative allocations (potential natural vegetation, current operating conditions, etc.).

The application of the temperature criteria is based on maximum temperatures, regardless of how long and where in the water column they occur. That is not to say this is not important information, particularly in properly interpreting the temperature data; it is just ancillary to the determination of whether a violation of the criteria occurs or not. The cumulative frequency distribution, which stakeholders asked Ecology to use, does not indicate the number of days when the criteria were exceeded. Ecology made statements throughout the TMDL describing the temperature violations and where they occur in the river. Ecology does not intend for our analysis to be completely described by one table in the TMD L; therefore, conclusions about the temperature violations should not be based upon two tables in the report. Ecology will be mindful in future press releases to clarify the extent of the temperature problem.

The definition of significant warming, in terms of the TMDL, is that the current daily maximum temperature condition in relation to what occurred naturally, when temperatures are greater than 20oC, are not to exceed 0.3oC. This is a relatively low threshold of temperature change. In addition, the application of the Pend Oreille River criteria is based on daily maximum temperatures. While the river is well mixed there is still some differentiation in the magnitude of daily maximum temperatures through the water column principally during the period when the greatest temperatures occur, mid-July to mid- August. This temperature differentiation is most noticeable in the forebay reaches. At these times and settings, greater daily maximum water temperatures occur within the upper water column as opposed to temperatures observed at the river bottom. Ecology is unaware of what is meant by “at depth,” and in addition, sampling at a particular depth may not detect the maximum temperature in the water column. Also, the CE-QUALW2 model averages temperatures from across the river, one meter deep and for approximately 100 meters downstream. So, site-specific measurements would be expected to vary slightly.

The relatively small differences between surface and bottom daily maximum temperatures, tending to be less than 1oC, may be the reason why the indicated study made the assessment that river temperatures through the water column were similar. Not even where the water column temperature variation is the greatest, in the forebay reaches, could the level of this variation be characterized as stratified.

Ecology is using a peer-reviewed model to provide the estimates for the TMDL, and we disagree that the results are suspect. The highest daily maximum temperatures of the year across the study area occur in the forebay reach of Box Canyon dam. The dam has altered the hydraulic characteristics of the river, leading to the increased heating. While this effect is most noticeable in the forebay reach, the upstream Tiger reach is also affected. With the dam‟s effect on river hydraulics removed (scenario 4), the heating patterns for Tiger and the Box Canyon forebay reaches conform to those of the upper reaches. Based on the TMDL‟s 2004 modeled temperatures analysis, applying to the period when daily maximum temperatures exceed 20oC, the dam‟s removal resulted in an estimated decline in average daily maximum temperatures of 0.99oC for the forebay reach and 0.52oC for the Tiger reach. A similar magnitude in the decline in daily maximum temperatures was determined for 2005.

Ecology agrees with this statement for Part 1 of the criteria and included language in the TMDL on page 43. However, the analysis for Part 2 of the criteria indicates that because the reservoirs cool more slowly than under natural conditions, the reservoirs actually act as a source of warmer water to the tailraces in the fall. Therefore, during the fall critical period, the Boundary Forebay is more likely to contribute to temperature exceedences in the tailrace than Seven Mile Dam.

TMDL development using water quality models requires decisions on how to process and interpret the output from the model. These decisions center on the issue of how to aggregate (combine) data over time and space. Data aggregation decisions are made on a case-by-case basis in TMDLs based on a variety of factors, including the pollutant of concern; language of applicable water quality criterion; type of water body; model output complexity; and margin of safety concerns. Earlier in this document, Ecology responds to concerns about the CFA method used for aggregating information over time. This comment regards aggregation over space. Ecology decided not to aggregate the temperature in the vertical dimension. Alternatives such as volume-averaging and flow-averaging would have reduced the resolution of the TMDL in identifying vertical variations in temperature from the surface to the bottom of the water column. Washington‟s temperature standard for the Pend Oreille River is a one-day maximum temperature, rather than a daily average, requiring the TMDL analysis to use a maximum temperature. The temperature criterion is a threshold value that should not be applied as a waterbody average. Therefore, applying a volume-weighted average in the TMDL would be inappropriate. Conducting the TMDL analysis using one-meter-deep cells at the surface is consistent with Ecology‟s general approach to developing TMDLs. Because modeling for TMDLs must consider critical conditions, assumptions made for modeling are not necessarily the same as those used for monitoring. The water quality standards refer to dominant aquatic habitat for guidance on where to take temperature measurements and not how to determine compliance with the standard. For water quality monitoring, Ecology‟s Standard Operating Procedure for Manually Obtaining Surface Water Samples refers to the surface as the top fifteen centimeters or six inches. The top meter or three feet is not considered the surface. Ecology does not agree that the volume-weighted average would provide a more accurate and reliable representation of aquatic habitat. Moreover, the TMDL must include a margin of safety, and the approach taken provides a safety factor.
See response to question 1 in this section. TMDLs determine compliance with water quality standards, which is a one-day maximum for the Pend Oreille River. The modeling is intended to determine natural and existing conditions for comparison purposes. For this TMDL, the natural condition of the un-impounded river cannot be reasonable compared to the hydrology of a reservoir. Averaging the entire column of the reservoir could not be reasonably compared to the natural condition of a shallower river. Using the upper layer of the water column allows for that comparison. Ecology believes the modeling and analysis for the TMDL is representative of the thermal impairments in the Pend Oreille River. The model used by the TMDL calculates average temperature within each cell that extends from stream bank to stream bank, downstream for about a hundred meters, and one meter deep. If the river is indeed well-mixed, then using the temperature at the top meter should not be that different from an average temperature from the water column, thereby not overestimating the amount of heating taking place. Using a vertical average or volume-weighted temperature may obscure the impacts of warmer surface waters. Washington‟s water quality standards discourage this approach.

See response to questions 1 and 2 in this section. Ecology included a statement on page 26 of the TMDL explaining why a volume or flow-weighted average temperature is inappropriate to use in the analysis.

Ecology is unsure how the statements cited are inconsistent. See response to questions 1, 2, and 3 in this section.

Comment noted. See responses to questions 1 through 3 in this section.

Ecology agrees that the river does not stratify. Thank you for the clarification on Pend Oreille Lake levels. We clarified that the dam allows cold water exchange on page xi and 42 of the TMDL.

The Pend Oreille River does not stratify, but there is a slight temperature difference from the top to the bottom of the water column in some reaches of the river, as shown by the temperature profile data in Appendix C of the TMDL. The TMDL identified that the temperature criteria is exceeded by less than 1oC. So, when the dams withdraw water from deeper in the water column, the water is slightly cooler and does make a difference in downstream temperatures.

See response to questions 1 and 2 in this section

See response to question 2 in this section. The river does not cool between Newport and Blueslide, but the TMDL modeling indicates that with the exception of the Skookum reach, existing temperatures are cooler now than they were under natural conditions. The river is cooler now because slightly colder-than-natural water from Lake Pend Oreille buffers heat sources in this stretch of river, which is the intent of the statement in question. Ecology clarified the statement in the TMDL.

The CE-QUAL-W2 model generated temperature estimates for natural or predam conditions upstream of Albeni Falls Dam. Ecology clarified the source of cooler water below Albeni Falls Dam in the TMDL.

See response to questions 1 and 2 in this section.

The TMDL states that the Pend Oreille River is generally well-mixed and does not stratify. See response to question 2 in this section.
TMDL analysis results show that depending upon the location in the river, natural conditions can be warmer than existing conditions, and existing conditions can be warmer than natural conditions. Figures 18 and 19 illustrate the relationship between the natural and existing temperatures from June through September in the forebay areas of Box Canyon and Boundary dams. See also responses to questions 6 through 8 in the TMDL Analysis section of this Response to Comments.

Ecology‟s analysis shows that around 20oC, existing temperatures are warmer than what is predicted to have naturally occurred, but the temperatures are within the temperature increase allowed by the standards. See responses to questions 6 through 8 in the TMDL Analysis section of this Response to Comments for a discussion on why Ecology used a cumulative frequency distribution analysis rather than a daily comparison of existing and natural conditions. Nevertheless, in a June 16, 2009 report from Keta Waters to the Kalispel Tribe, the river was reported to exceed the Washington State temperature standard only three (3) times at the state line in 2004 using a daily comparison of natural and existing temperatures. The average temperature exceedence recorded was 0.26oC above the allowable 0.3oC increase.

As discussed previously, the criteria are based on daily maximum water temperatures that, during the summer period, occur in the upper water column. This is where the greatest daily maximum water temperatures are observed in the Box Canyon forebay reach. From the forebay, river water is withdrawn for power generation at a depth residing below where the daily maximum temperatures occur at the river surface. This flow is then discharged downstream, providing this cooling effect.

Page 61 and 62 of the TMDL explain that the heating in the Skookum reach is due to a submerged side channel, the Skookum Slough. The slough is an extensive backwater side channel occurring between river miles 74 and 76. A forward-looking infrared (FLIR) survey of the Pend Oreille River, conducted on August 16, 2001 by Watershed Science, LLC determined the temperature of the side channel at 27.3oC, about 3.4oC greater than the main river channel. In the TMDL analysis, one of the temperature modeling scenarios undertaken was one in which downstream hydroelectric facilities were removed in order to examine their effect on the existing temperature condition (scenario 4.0). The results of that scenario for the Box Canyon reaches were that with the removal of the Box Canyon facility and the dam‟s backwater effect removed, this side channel no longer functioned as a source or location for water heating. The reaches upstream and downstream of Skookum do not have any submerged side channels so they are cooler.

See response to question 1 in this section.

See response to question 1 in this section.

The Quality Assurance Project Plan (QAPP) includes a review of a TIR survey conducted by Watershed Science, LLC (http://www.ecy.wa.gov/pubs/0403109.pdf). The following statement from the TIR review supports the language in the TMDL

"The side-channel complex on the right bank of the Pend Oreille between river miles 74.5-76 is a big heat sink. The side channel complex is near the Skookum Community Center (see Figure A-3). In big rivers, side-channels could help provide refugia for fish migrating along the river corridor but most side channels in the Pend Oreille show extremely warm temperatures in the TIR images."

The Skookum reach begins at river mile 76.8 and ends at river mile 72.4, so the slough encompasses at least one and a half miles of the four mile reach. This is a large enough distance to increase maximum temperatures by 0.21oC (the temperature above criteria) throughout the reach.

See responses to 1 and 4 in this section. Ecology did review the model for errors. Model reports for the river (PSU 2006, PSU 2007, Breithaupt & Khangaonkar, 2007) discuss model development and calibration. The placement of temperature probes should not greatly influence the model output because the model averages the temperature across the river for approximately 100 meters downstream and one meter deep.

As mentioned in the report, it is believed that the increased warming determined for the Skookum Reach is due to the inundation of an extensive backwater side channel occurring between river miles 74 and 76. A forward-looking infrared (FLIR) survey of the Pend Oreille River conducted on August 16, 2001 by Watershed Science, LLC determined the temperature of the side channel at 27.3oC, about 3.4oC greater than the main river channel. In the TMDL analysis, one of the temperature-modeling scenarios undertaken was one in which downstream hydroelectric facilities were removed in order to examine their effect on the existing temperature condition (scenario 4.0). The results of that scenario for the Box Canyon reaches were that with the removal of the Box Canyon facility, and the dam‟s backwater effect removed, this side channel no longer functioned as a source or location for water heating.

See responses to questions 1 and 4 through 6 in this section.

A different methodology for determining compliance in the Kalispel river reach was required because the Kalispel Tribe‟s water quality criteria are different than Washington State‟s. Because different temperature criteria apply to the reach, Ecology had to analyze the river differently. Ecology is required to meet the Tribe‟s criteria at the reservation boundary, which is why we only analyzed the segments bordering the Reservation. The TMDL does not apply to Kalispel Tribal waters, which is why we did not evaluate the entire river reach.

See response to question 1 in this section. Ecology clarified the reason for the different methodology on page 28 in the TMDL.

Because the natural and existing modeling scenarios represent hydraulic conditions prior to and following hydroelectric power generation on the Pend Oreille River, water temperature response to meteorological factors will reflect those changes. For instance, now with the hydroelectric facilities in place, during the mid-July to mid-August period, when the warmest water temperatures occur, the river is deeper due to greater storage. As a consequence, river water temperatures now are buffered from large temperature changes in response to changing meteorological conditions, particularly in comparison to those representing the natural condition. The natural condition water depths during the critical period were shallower and, therefore, both gained and lost heat at a faster rate, being more sensitive to changing meteorological conditions.

The purpose of the implementation strategy in the TMDL is to give a general overview of the types of activities that will be performed to meet water quality standards. Specific actions to achieve compliance with Tribal criteria will be included in the implementation plan. After EPA approves the TMDL, Ecology will work with the Tribe and other stakeholders to identify specific actions that explain who will do what activities, where in the watershed, and when.

Ecology used the cumulative frequency distribution analysis at the Kalispel Tribe Reservation boundary so that the results are consistent along the entire river by applying the same analysis methodology to all the various temperature criteria for the river. Ecology‟s rationale for using the cumulative frequency distribution analysis, instead of the day-to-day analysis, is discussed in the TMDL Analysis section of this Response to Comments. See also response to question 13 in the General section of this Response to Comments.

Ecology‟s analysis found that the Kalispel Tribe‟s criteria were exceeded at the upstream reservation boundary, but there are slight differences (0.24oC) with Keta Waters‟ analysis in the maximum temperature impairment. Table 3 of the Aug. 10, 2010 memo from Keta Waters to the Kalispel Tribe indicates that there were 22 days that water temperatures did not meet criteria at the upstream Reservation boundary. The average violation was 0.26oC and the maximum temperature was 0.54oC above the allowable temperature increase. However, Keta Waters based their analysis on volume-weighted average temperatures, and it is unclear which Kalispel Tribal criterion produced the violations in the table (daily max of 20.5oC, or 7-day average daily maximum of 18oC).
Ecology did not use volume-weighted averages for several reasons discussed in the Volume / Flow Weighted Average section of this Response to Comments. In addition, Ecology found there is about 0.2oC difference in the maximum impairment, depending upon which Kalispel Tribal criterion was used (see Table 7 in the TMDL). See also response to questions 6 through 8 in the TMDL Analysis section of this Response to Comments.

See response to question 5 in this section.

See responses to questions 4 and 6 in this section.

See responses to questions 4 and 6 in this section.

As stated on page 3 and 71 of the TMDL, Ecology recognizes that determining heat load based on maximum temperature and the entire river volume would overestimate the amount of heat in the river. For this reason, Ecology is using temperature in degrees C to measure compliance with the TMDL. However, the equation must be placed in the TMDL to satisfy EPA requirements.
The water quality standards refer to dominant aquatic habitat for guidance on where to take temperature measurements and not how to determine compliance with the standard. Therefore, dominant aquatic habitat is not a consideration in the TMDL.

The state forest practices rule will be used to implement the TMDL consistent with the language on pages 88 and 89 of the TMDL. See also responses to questions 7 and 8 in the General section of this Response to Comments.
Ecology could not calculate the level of exceedence for Part 2 of the criteria in 2005 because the model could only predict temperatures until Sept. 9, 2005. The reason the model could not be run past this date is that the upstream boundary conditions from the river in Idaho were not available.

Yes, each reach and side of the Pend Oreille River has its own value. We have added more information to the table to help clarify the targets.

The TMDL specifies different timelines to meet the allocations, depending upon the temperature source. Page 95 and 96 of the TMDL say that the Pend Oreille PUD and Seattle City Light have up to ten years to meet standards. These timelines are developed in the 401 Certification through compliance schedules in a Water Quality Attainment Plan as described by rule [WAC 173-201A-510(5)] and therefore must be followed. A similar rule does not exist for tributary and mainstem shade, which is why the TMDL allows up to 50 years to meet the allocations. Ecology set this timeline because many years are needed for trees to grow to the required height and canopy cover. The 50-year timeline is consistent with other temperature TMDLs with shade allocations.
The TMDL evaluated all sources of heating: upstream sources in Idaho, mainstem shade, tributary shade, point sources, and dams. Ecology established load and wasteload allocations consistent with our analysis. See also the TMDL Analysis section of this Response to Comments.

Ecology‟s use of temperature rather than loads to set the allocations is consistent with other temperature TMDLs involving reservoirs (Willamette Basin, Snake River – Hells Canyon, and the draft Columbia/Snake Rivers developed by EPA). Temperatures are typically used for TMDLs involving dams because loads (the allowable heat multiplied by flow) over-estimate the amount of heat in the river. This is especially true in the Pend Oreille River TMDL because of the maximum temperature standard. Expressing the allocation as a load would be equivalent to the maximum temperature being present throughout the entire water column. In reality, maximum temperatures are typically, but not always, found near the top of the water column. See also pages 3 and 71 of the TMDL. The TMDL established a summer and fall critical period, each two months long, which are based on the water quality standard for the Pend Oreille River. Air temperatures and river flows indicate that 2004 was a hot, low-flow year so it meets the TMDL critical condition requirement. See also the TMDL Analysis section of this Response to Comments. Ecology reviewed the document to identify and fix any confusing statements.

With the exception of Calispell Creek, all Pend Oreille River tributaries that are listed as impaired are included in the Pend Oreille River temperature TMDL. As explained on page 5 of the TMDL, Calispell Creek was not included in the TMDL because a separate model was developed for the creek that could be used for developing a TMDL in the future or be used to direct implementation activities. Ecology applied the correct criteria to the tributaries and page 34 of the TMDL describes how Ecology performed the shade analysis. The Colville National Forest temperature TMDL applies within the Colville National Forest. See also responses to questions 2 and 5 under the Colville National Forest TMDL section of this Response to Comments.

The TMDL analysis showed that the treatment plants do not have an effect on river temperatures, and therefore do not use a portion of the load capacity. Table 9 on page 60 of the TMDL shows that in 2004 the point sources had a 0.00oC effect on temperatures, whereas tributary and mainstem shade had an effect between 0.01 and 0.05oC. In addition, during the summer critical season (low river flows and temperatures exceeding 20°C), temperature data from each point source showed that temperature increases at their mixing zone boundary were below 0.3°C. However, it is important to note that like shading, point sources received an allocation that Ecology will track and enforce in their permits. Ecology edited the language on page xiii to better reflect this information.

The implementation strategy in this TMDL is a general overview of what will be done to reduce temperatures and is not intended to provide information about specific actions each organization will take. Specific actions are included in the implementation plan such as who will do what, by when and where. Ecology will develop the implementation plan with help from the stakeholders once EPA approves the TMDL. Reasonable Assurance is required when a wasteload allocation is set at a lower limit due to assumptions that capacity will be available by reducing nonpoint sources. EPA Region 10 TMDL Review Guidelines (Jan. 2002) state that "…where a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur, reasonable assurance that the nonpoint source reductions will happen must be explained." In the Pend Oreille temperature TMDL, the point sources did not have an impact on the river‟s temperature, yet they received a wasteload allocation for their current temperatures. So, the wasteload allocations are set at a level protective of water quality and are not dependent on nonpoint source load reductions. In the TMDL, Ecology also set aside a portion (0.06oC) of the 0.3oC human use allowance above natural conditions for future growth. For these reasons, Ecology believes there is a reserve capacity for future growth. EPA‟s Region 10 TMDL Review Guidelines (Jan. 2002) also state

Page 34 of the TMDL describes how Ecology performed the shade analysis. Not all tributaries in the TMDL have char spawning and rearing as a designated use. In fact, the char spawning and rearing designation does not apply to the entire length of most tributaries. For a list of the tributaries and tributary segments designated as char spawning and rearing, see page 7 of the TMDL. In the Pend Oreille River temperature TMDL, the load allocations set for the tributaries in Table 14 (page 78) are equivalent to natural potential vegetation or the trees that can grow and reproduce on a site given soil, elevation and weather conditions. Ecology clarified this information in the TMDL. The Pend Oreille River temperature TMDL applies to the tributaries listed in Table 14 from the Colville National Forest boundary to the confluence of the Pend Oreille River, with the exception of the East Branch of LeClerc Creek. (The East Branch LeClerc Creek received a load allocation on state or private land within the Colville National Forest Boundary.) Table 14 included a list of Pend Oreille River tributaries and their allocations set by the Colville National Forest TMDL. To minimize confusion Ecology edited the table. See also the response to question 8 in this section and the Colville National Forest section of this Response to Comments.

See response to question 10 in this section.

See response to question 10 in this section.

See response to question 7 in this section. After stakeholders reviewed the Aug. 2007 draft of the TMDL, stakeholders and MOA participants discussed and proposed to use temperature for the allocations while referencing a loading equation. In December 6, 2007, EPA sent an email to the MOA participants stating this approach is acceptable.

See response to question 7 in this section.
Ecology fails to understand how the sources were “ignored” or “not reduced” when we assigned them allocations. The wasteload allocation for the point sources is current operating conditions. Each dam has an allocation of 0.12oC above natural conditions. See also responses to questions 9 and 10 in this section.

See response to question 16 in this section, as well as responses to questions 6 through 8 in the TMDL Analysis section of this Response to Comments.

See response to question 10 in this section.

Ecology did not make the suggested changes. This summer critical period allocation is based on the amount of heating in the forebay of Boundary Dam. Any effect from Box Canyon Dam during the summer dissipates by the Slate river reach, upstream of the Boundary forebay, which is why the allocation cannot be additive. The maximum temperature difference during the summer in the forebay between the natural and existing conditions is 1.0oC (see Table 6 on page 41 of the TMDL). Since Boundary Dam was allocated 0.12oC above natural conditions, this is equal to a 0.88oC temperature reduction. Page 79 of the TMDL explains another way to calculate the required temperature reduction.

Ecology added additional language on page 79 to clarify the Part 2 allocations.

Ecology reviewed Ponderay Newsprint‟s discharge monitoring report (DMR) data during the summer critical period and found that the maximum discharge during this time (July 2004) was 5.20 million gallons per day (mgd). We used this maximum flow to calculate the allocation. The maximum flow of 5.7 mgd referred to in the Fact Sheet for the NPDES permit occurred in May 2005, outside the summer and fall critical period. In response to your comment, we reviewed the DMR data from 2003 through November 2010. The data shows flows during the summer critical period have decreased since 2004. Therefore, we will continue to use 5.2 mgd to calculate Ponderay Newsprint‟s allocation.

2004 is representative of critical conditions, which means that Ecology modeled the river under high temperatures and low flow conditions. This is done so that the TMDL allocations will likely be met during more extreme weather conditions. Daily average flows in June and July were at the 13th and 29th percentiles, respectively. Air temperatures in 2004 were very warm and exceeded the 90th percentile. (See pages 20-21 of the TMDL.) Therefore, if the weather is warm and flows are low, the results should not be that different from the TMDL. To clarify the intent of applying the TMDL at the state line, Ecology edited the language in this section of the TMDL. Ecology replaced the term “allocation” with “assumption.” The stateline assumption will be evaluated along with the allocations. Ecology will continue to collect monitoring data at Newport while agencies and organizations work to implement the TMDL. After several best management practices (BMPs) and other implementation measures have been applied and as resources allow, Ecology will use the monitoring data to update and rerun the model to determine compliance.

Ecology edited the language in the TMDL to clarify the intent of applying the TMDL at the state line. Ecology replaced the term “allocation” with “assumption.” Ecology is not regulating point sources in Idaho by making an assumption about water temperature at the state line. Ecology had to make a baseline temperature assumption at the state line in order to establish allocations in Washington. The Idaho Department of Environmental Quality (IDEQ) is responsible for determining how sources in Idaho meet Idaho‟s water quality standards and with Washington‟s standards when the water crosses the state line. Because the state line assumption is based on a high temperature, low-flow year (see response to question 1 in this section), Ecology anticipates that IDEQ will not need to take further action.

Loading capacity in the Pend Oreille temperature TMDL is the amount of heat the river can have in it and still meet state water quality standards. The TMDL acknowledges that at the state line, river temperatures meet standards because they are cooler than what occurred naturally. Therefore, establishing a loading capacity at the state line is not necessary. The goal of the TMDL is to maintain compliance with the temperature standard into the future, which is why Ecology assigned the assumption. If something should happen to Albeni Falls Dam, Ecology would need to reassess the river because Albeni Falls Dam controls the river flows in Washington. See response to question 2 in this section.
Ecology‟s goal at the state line is to maintain temperatures that meet Washington‟s standard, which is also the goal of the anti-degradation policy. The intent of the language in the draft TMDL was to highlight this joint goal. To clarify the intent, Ecology edited the TMDL‟s language about the state line. The purpose of setting a temperature value at the state line in the TMDL is to provide a baseline of what is coming from Idaho, from which to develop allocations in the TMDL for Washington sources. Anti-degradation policies (when the waters are cooler than the standard) would only come into play during the permitting process if a new or expanded discharge were to cause a measurable change in water quality. In the case of Washington dischargers, the measurable change would be defined as causing a greater than 0.3 C degree increase in temperature. The current point source discharge to the part of the river that is cooler than the temperature standard on the Washington side (City of Newport) is an existing discharger, and does not cause greater than a 0.3 C degree increase to the river. Therefore, the Tier II anti-degradation requirements to consider socio-economic factors would not apply. For Idaho dischargers that propose to cause a measureable change to temperature

See response to question 3 in this section. Establishing a loading capacity at the state line is not something that Ecology can do because it has no jurisdiction in Idaho.

The suggested statement is beyond Ecology‟s jurisdiction. The Idaho Department of Environmental Quality (IDEQ) is responsible to determine what actions, if any, are needed to comply with Idaho‟s water quality standards and with Washington‟s standards when the water crosses the state line. See also response to question 2 in this section.

Ecology analyzed the entire length of the Pend Oreille River in Washington from July through October. The analysis showed that the river met standards at the state line during this time frame.

Ecology disagrees with this comment. The TMDL analysis indicated that the water flowing from Idaho is cooler now than historically, and this effect is detected for several miles downstream. See also the TMDL Analysis section of this Response to Comments.

The TMDL analysis showed that downstream temperature violations are not the result of water temperatures from Idaho. The state line assumption protects the cooler water at that location. See the TMDL Analysis section of this Response to Comments.

The TMDL assumes that water coming from Idaho will be in compliance with Washington‟s water quality standards. This does not establish allocations to sources in Idaho. See also the response to question 2 in this section.

2004 is representative of critical conditions, which means that Ecology modeled the river under high temperatures and low flow conditions. This is done so that the TMDL allocations will likely be met during more extreme weather conditions. Daily average flows in June and July were at the 13th and 29th percentiles, respectively. Air temperatures in 2004 were very warm and exceeded the 90th percentile. (See pages 20-21 of the TMDL.) Therefore, if the weather is warm and flows are low, the results should not be that different from the TMDL, especially since the difference between natural and existing conditions is generally less than 1.0oC.

The TMDL does not put temperature limits on Idaho dischargers. See response to question 2 and 6 in this section.

The privately or state-owned portions of the tributaries within the Colville National Forest boundary are not covered by either TMDL, with the exception of the East Branch of LeClerc Creek. The reason for this is that in the Pend Oreille TMDL, East Branch LeClerc Creek received a shade allocation for private land above the national forest boundary. Ecology clarified the TMDL on page 5 to reflect this distinction.

The Colville National Forest TMDL used the 1997 temperature water quality standard because EPA disapproved the 2003 state-adopted temperature criteria. Federal actions, such as TMDLs, must use EPA-approved water quality standards. Ecology was required to use the 1997 temperature standard because it had EPA approval. The EPA did not approve the temperature criteria until February 2008, well after all the Colville National Forest TMDL documents were completed.
Not all watershed streams are designated as char spawning and rearing by the state water quality standards and therefore required to meet 12°C. For a list of tributaries listed as char spawning and rearing see the bottom of page 7 of the TMDL.

The Colville National Forest calls for an average shade level of 80 percent. The Pend Oreille TMDL calls for shade from natural potential vegetation on the tributaries, which on average is roughly 80 percent (determined from Table 14 in the TMDL). Effectiveness monitoring of the Colville National Forest TMDL will provide information on whether the amount of shade is increasing (i.e. there is progress toward meeting the shade targets), and how well the shade is working to meet the temperature criteria. If data show the shade requirements will not meet the appropriate criteria for the stream (12oC or 16oC) and additional shade is possible, Ecology may amend the TMDL. See also question 4 in the Water Quality Standards section of this Response to Comments.

See response to question 3 in this section.
The Colville National Forest temperature TMDL applies to tributaries within the Colville National Forest. The Pend Oreille River temperature TMDL applies to the tributaries listed in Table 14 in the TMDL from the Colville National Forest boundary to the confluence of the Pend Oreille River, with the exception of East Branch LeClerc Creek (see response to question 1 in this section). Ecology is unaware of the conflicting conclusions referenced. However, because there are three different temperature criteria that apply in the tributaries to the Pend Oreille River, one can be easily confused. Beginning in the headwaters, which is in the Colville National Forest, tributaries with bull trout, or segments of them, have a 12oC temperature criteria. Tributaries not designated as bull trout within the National Forest boundary have a 16oC temperature criteria. Once the tributaries flow downstream of the National Forest boundary, the temperature criteria is 17.5oC unless the water quality standards designates a tributary as char spawning and rearing, in which case the 12oC criterion applies. The amount of required shade varies depending on the criteria and upon the tributary‟s location within the watershed. Table 14 lists the amount of shade needed for each tributary to meet the

The Colville National Forest did not use the wrong temperature criteria. See response to questions 2, 3, and 5 in this section.

See response to questions 2, 3 and 5 in this section. Page 34 of the Pend Oreille temperature TMDL describes how Ecology performed the shade analysis. Ecology added information in the TMDL about the margin of safety for the tributary TMDLs on page 81, and information about public participation can be found on pages 100 and 101 of the TMDL.

See response to questions 2, 3, and 5 through 7 in this section.

See response to questions 2, 3, and 5 through 7 in this section, as well as response to question 11 under the Allocations section of this Response to Comments.

The Pend Oreille River in Washington is listed as impaired on Washington States‟ Water Quality Assessment. Water bodies listed as impaired need to have TMDLs or another similar plan developed to address the water quality impairment and remove the water body from the impaired waters list. A TMDL was also needed because Ecology‟s modeling has shown that in some reaches of the Pend Oreille River, existing temperatures are warmer than they were naturally.

It is true that the state's forest practice regulations do not require leaving vegetated buffers along seasonal, non-fish bearing streams. For perennial non-fish waters, the regulations establish a 50-foot riparian buffer, measured horizontally from the bank full edge on each side of the stream. Trees can be cut from this zone as long as basal area requirements are met. Whether the rules allow removal of 30% of the trees or not depends on the type of harvest and on site-specific conditions. [See WAC 222-30-022 (2)(b).]

The implementation plan for the Colville National Forest TMDL (October 2006) requires the Colville National Forest (CNF) to follow Forest Service guidance for riparian areas as described in the Inland Native Fish Strategy (INFISH). INFISH standards specify larger riparian buffers than the state's forest practice regulations (WAC 222). The TMDL was written to be consistent with the Forest Service's internal standards and guidelines and was agreed to by the CNF. The Memorandum of Agreement (November 2000) between Region 6 of the Forest Service and Ecology only requires that activities on National Forests meet or exceed the water quality protections in the state forest practice rules. The stream-side buffers and other requirements in the state forest practices regulations were developed with the expectation that they would be protective enough to meet the state's temperature standards. To check this, a formal adaptive management process was set up to assess and revise the rules, as needed. Ecology is actively involved in this adaptive management process along with the other cooperators in the Forest and Fish program. (See pages 88-89 of the TMDL). The adaptive management group is currently conducting a number of ongoing studies designed to evaluate the riparian rules.

During the summer critical season (low river flows and temperatures exceeding 20°C), each discharger‟s temperature increase at their mixing zone boundary falls below 0.3°C. Lower receiving water temperatures generally occur at high river flows with corresponding larger dilution factors. The point sources do not have a reasonable potential to exceed less restrictive incremental temperatures increases given by the equation t=34(T+9), where "T" represents the background temperature as measured at a point or points unaffected by the discharge. These incremental increases range from 1.1°C at a background temperature of 20°C, and 1.8°C at a background temperature of 10°C. The TMDL does fix thermal loads at current conditions. Please refer to the discussion on pages 74 through 75 of the TMDL. Modeling done as part of this TMDL showed that the NPDES point source dischargers did not cause significant shifts in river temperatures. Nonetheless, Ecology will encourage dischargers to look for opportunities to reduce effluent temperatures, in addition to requiring the dischargers to meet the WLAs in this TMDL.

The NPDES permits must contain effluent limits for temperature consistent with the WLAs contained in the TMDL. Ecology set these WLAs to prevent further degradation of receiving water temperatures from the point source dischargers. Modeling done as part of this TMDL showed that the NPDES point source dischargers did not cause significant shifts in river temperatures. Nonetheless, Ecology will encourage dischargers to look for opportunities to reduce effluent temperatures, in addition to requiring the dischargers to meet the WLAs in this TMDL. Also see response to question 5 in the Kalispel Tribal Waters section.

Reasonable Assurance is required when a wasteload allocation is set at a lower limit due to assumptions that capacity will be available by reducing nonpoint sources. EPA Region 10 TMDL Review Guidelines (Jan. 2002) state that "…where a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur, reasonable assurance that the nonpoint source reductions will happen must be explained." In the Pend Oreille temperature TMDL, the point sources did not have an impact on the river‟s temperature, yet they received a wasteload allocation for their current temperatures. So, the wasteload allocations are set at a level protective of water quality and are not dependent on nonpoint source load reductions.

EPA‟s guidance further states that "Such reasonable assurances…may be non-regulatory, regulatory, or incentive-based, consistent with applicable laws and programs." FERC licenses and Ecology‟s 401 Water Quality Certifications (401) qualify as components of Reasonable Assurance. The 401 provides a regulatory avenue for Ecology to ensure that actions taken to reduce temperatures are completed. After EPA approval of the TMDL, Ecology will develop an implementation plan in cooperation with the stakeholders. The implementation plan will